THURSDAY, JULY 10, 1913.

ATOMS AND MOLECULES.

Les Atomes. By Prof. Jean Perrin. Pp. xvi + 296. (Paris: Félix Alcan, 1913.) Price 3.50 francs.

IN these days, when such notable and extensive advances are being made in nearly all fields of physical research, it is extremely desirable that the results which mutually bear upon one another should from time to time be collected together and recorded in more or less popular language. If, in addition, a leading expert can be persuaded to undertake the record, the event of its publication is still more to be welcomed. Prof. Perrin is the ideal author for a book on atoms and molecules. He has virtually made them visible and established their reality, and it is scarcely too much to say that his work on Brownian movement is the most notable of recent physical researches.

It is not always that the brilliant experimentalist is an equally brilliant exponent, but in the present case it is true, and the book makes fascinating reading. It must not be supposed that Prof. Perrin has confined his attention to the particular sphere of work with which his name is so intimately associated. Naturally enough, the details of theory and experiment are treated more completely in those chapters which are mainly records of the author's work. But the book as a whole has a broad outlook, and the atomic theory is considered from many different points of view and in the light of all the recent developments of the subject.

The first two chapters are devoted to a historical survey of the chemical and physical sides of the atomic theory and the early methods of estimating the size and number of the atoms. Then follow the chapters on Brownian movement previously referred to, in which the author shows how it is possible by four distinct methods to measure the atoms, with remarkably consistent results. The later chapters on opalescence, the quantum theory, and radio-activity have the same end in view, and in conclusion the author compiles the values obtained by thirteen different methods for Avogadro's number. A quotation from the author is the best comment on these noteworthy results.

"On est saisi d'admiration devant le miracle de concordances aussi précises à partir de phénomènes si différentes. D'abord qu'on retrouve la même grandeur, pour chacune des méthodes, en variant autant que possible les conditions de son application, puisque les nombres ainsi définis sans ambiguïté par tant de méthodes coïncident, cela donne à la realité moléculaire une vraisemblance bien voisine de la certitude."

Chapter vii. is one of special interest. In it the author deals with the determination of e, the atom of electricity, by the method of falling drops. He takes the view that the accuracy claimed by Millikan for his measurements is not justified on account of the magnitude of the correction to Stokes's law which has to be applied, and produces evidence which he regards as removing the well-known discrepancy between his own and Millikan's estimates. It remains to be seen whether Prof. Millikan assents to this view.

THE CULT OF THE THUNDERSTONE.

The Thunderweapon in Religion and Folklore. A. Study in Comparative Archæology. By Dr. Chr. Blinkenberg. Pp. xii + 122. (Cambridge University Press, 1911.) Price 5*s.* net.

THIS little book forms an interesting addition to the archæological and ethnological series for which anthropologists are indebted to the Cambridge University Press. The author shows much erudition and industry in his search for specimens illustrating the cult of thunderstones which are preserved in the museums of England and the Continent. He has explored the voluminous literature of the subject, and he has added a series of illustrations which add much to the scientific value of the monograph.

His theory assumes that the cult of the thunderstone was an element of human culture which, at an early date, that is to say, in the Stone age, was gradually spread from people to people over a great part of the world; that it appears in the early Ægean culture; that the ideas of tabu or sanctity attaching to these stones indicate the rise of the belief from primitive conceptions of nature and religion. In other words, he supposes that as early as the Stone age men compared the effects of the lightning-stroke to that of the axe wielded by primitive man, and that this explanation accounts for the superstition in most parts of the world.

Various difficulties, of which the author is aware, prevent the acceptance of this theory of origins. The most important is that the superstition has not been traced among those races which possessed a Stone age culture down to modern times—the peoples of Australia, Oceania, and North America—while in South America, to say the least, the evidence is weak. On the other hand, it is common in Africa, among races which

©1913 Nature Publishing Group

have no such theory of the origin of objects which they supposed to be divinely produced. These facts being admitted, a different explanation suggests itself as being more probable. Such things usually come to light after torrential rains, and are thus naturally attributed to the thunder which accompanies the storm; and thus, besides flint axes, things like belemnites, fossil echini, and other quaintly shaped stones come to be revered like lithic artefacts.

It is also very doubtful if Mjölnir, the hammer of Thor, or the double-axe of Crete come within this category. The former was not a stone, but a forged metal axe, and the sanctity of the latter was possibly due to its use as a sacrificial implement. Poseidon's trident, again, was more probably the fish-spear which is the natural weapon of a sea-god.

In short, thunderstones, sacred fossils, sacred axes, and tridents may have their origin in general animistic conceptions, and their cult need not necessarily have arisen in any single centre or from any one train of thought. However this may be, the facts which the author has collected form a useful contribution to the study of primitive beliefs.

PURE AND APPLIED CHEMISTRY.

(1) *Problems in Physical Chemistry with Practical Applications.* By Dr. E. B. R. Prideaux. Pp. xii+311. (London: Constable and Co., Ltd., 1912.) Price 7*s.* 6*d.* net.

(2) *An Introduction to the Physics and Chemistry of Colloids.* By Emil Hatschek. Pp. ix+94. (London: J. and A. Churchill, 1913.) Price 2*s.* 6*d.* net.

(3) *Exercises in Gas Analysis.* By Dr. Hartwig Franzen. Translated from the first German edition (with corrections and additions by the Author) by Dr. Thomas Callan. Pp. vii+120. (London: Blackie and Son, Ltd., 1913.) Price 2*s.* 6*d.* net.

(4) *Theorie und Praxis der Grossgasindustrie.* By Rudolf Mewes. Band 1. Hälfte 1. Pp. xx+403. (Leipzig: H. A. Ludwig Degener; London: Williams and Norgate, n.d.) Price 18*s.* net.

(5) *Lehrbuch der Thermochemie und Thermodynamik.* By Prof. Otto Sackur. Pp. viii+340. (Berlin: Julius Springer, 1912.) Price 12 marks.

(6) *A Foundation Course in Chemistry.* For Students of Agriculture and Technology. By J. W. Dodgson and J. Alan Murray. Pp. x+244. (London: Longmans, Green and Co., 1913.) Price 3*s.* 6*d.* net.

(7) *Qualitative Determination of Organic Compounds.* By J. W. Shepherd. Pp. xvi+348. (London: W. B. Clive, 1913.) Price 6*s.* 6*d.*

(1) DR. PRIDEAUX has compiled a book of problems to serve as exercises for students in physical chemistry. The students who have worked through these will not be able to complain that they have not been exercised sufficiently, as the examples selected are very numerous and by no means all easy. They are, however, selected directly from the original literature, and so require the student to give real solutions to real problems, instead of the sham answers to fictitious questions which so frequently disfigure books of chemical calculations. The form in which this excellent material has been published is much less satisfactory. The table of contents suggests that the volume is composed of eight chapters, but these do not appear in the text. The reader is informed on each of the 300 pages that the book he is studying is called "Problems in Physical Chemistry," but no hint is given as to the topic that is dealt with on the pages at which the book is opened. The eight chapters run on continuously, and almost the only way to discover where one chapter ends and another begins is to turn back to the table of contents, for the chapters are not even allowed the luxury of beginning at the head of a fresh page. As no index has been supplied, the contents of the book are far less accessible than they need be to a reader who does not wish to work right through the book from beginning to end.

(2) A somewhat similar complaint may be made in reference to the reprint of Mr. Hatschek's articles on colloids. These are divided into ten chapters, but the chapter-divisions do not correspond in every case with the natural divisions of the subject, and subject-headings are not given, so that the classification of the material is not immediately obvious. This defect is, however, very largely remedied by the provision of a very detailed table of contents and two indexes. The book has the great merit of presenting in a simple and readable form all the leading points of a difficult and little-known subject. It may be commended without hesitation to the many readers who at the present day are being compelled by the pressure of technical or scientific problems to acquire some knowledge of "colloid chemistry."

(3) The English translation of Dr. Franzen's "Gas Analysis" forms a very useful introduction to the subject. Directions are given for carrying out forty-two exercises. Thirty-three of these have to do with the analysis of gases. The remainder, which are collected under the heading

©1913 Nature Publishing Group